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# Burned out of context:

These dots don't connect



# Critic:

- Not this definition:
  - One who tends to make harsh or carping judgments; a faultfinder.
- This definition:
  - One who forms and expresses judgments of the merits, faults, value, or truth of a matter.



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# Burn, Burned:

- To consume (fuel or energy, for example)
- To be destroyed, injured, damaged, or changed by or as if by fire



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# A Goal for the Nation

Congress in 1992 set a goal for the amount of US motor fuel production to be supplied by replacement fuels by Year 2010?

Was the goal:

1. )        3 percent
2. )        7 percent
3. )        15 percent
4. )        30 percent



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# EPAct 1992 set two goals

- The interim goal Congress set for the Year 2000:
  - 10 percent replacement fuels
- The final goal for Year 2010:
  - 30 percent replacement fuels
  - (at least one half of which must be domestic)



# EPAct 1992 set two goals

- The interim goal Congress set for the Year 2000:
  - 10 percent replacement fuels
    - Replacement fuel use was 4.7 billion gallons of 162 billion gallons of on-highway motor fuel consumed.
    - About 2.9 percent
    - The 2000 goal was not achieved.
- The final goal for Year 2010:
  - 30 percent replacement fuels
    - DOE proposes that the goal of 30 percent for 2010 is not achievable
    - DOE proposes to keep the goal at 30 percent but to extend the date for achieving the goal to Year 2030.



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# Where we are today

- 2.5 percent replacement fuels in 2006
- 2.9 percent projected in 2010





# Replacement fuel (EPAct 1992)

“the portion of any motor fuel that is methanol, ethanol, or other alcohols, natural gas, liquefied petroleum gas, hydrogen, coal derived liquids, fuels (other than alcohols) derived from biological materials, electricity (including electricity from solar energy), ethers” or any other fuel that the Secretary determines meets certain statutory requirements.





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# Alternative fuel (EPAct 1992)

Defined to include many of the same types of fuels (such as ethanol, natural gas, hydrogen, and electricity), but also includes certain “mixtures” of petroleum-based fuels and other fuels as long as the mixture is “substantially not petroleum.”



# Replacement fuels in 2000

- The interim goal Congress set for the Year 2000:
  - 10 percent replacement fuels
    - Replacement fuel use was 4.7 of 162 billion gallons of on-highway motor fuel consumed.
    - About 2.9 percent
    - The 2000 goal was not achieved.
    - 92 percent of 4.7 billion gallons of replacement fuel was:
      - Oxygenates: MTBE and ethanol
      - Mostly MTBE



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# 2010 forecast

- 5.7 billion gallons (gge) of replacement fuel
- 2.9 percent of total on-road fuel
- Near-complete phase out of MTBE
- Ethanol to be 80 percent of replacement fuel



# 30 percent of what?

- 2000: on-road motor fuel consumption:
  - 10 mbpd (420 million gallons)
- 2010: on-road consumption:
  - 12 mbpd (504 million gallons)
  - 3.7 mbpd (155 million gallons) needed to replace 30 percent
    - (60 billion gallons annually)



# Brazil model?

- US passed Brazil in ethanol production
- Brazil replaced 44 % of gas 2004
  - Which equates to 34 percent on an energy-adjusted basis



## Base (most conservative) case

Reference	2020	2025	2030
Fuel use	14.42	15.36	16.46
CTL	.23	.58	.76
Ethanol	.49	.51	.514
Biodiesel	.02	.02	.02
Petroleum	13.58	14.14	15.03
Replace. %	5.83%	7.95%	8.65%

Results in mbpd

Source: AEO 2006





# High-price case

Reference	2020	2025	2030
Fuel use	13.2	13.97	14.86
CTL	.29	.81	1.69
Ethanol	.537	.6	.622
Biodiesel	.028	.03	.03
Petroleum	12.21	12.24	12.21
Replace. %	7.49%	12.37%	17.84%

Results in mbpd

Source: AEO 2006





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# Why does it take so long?

- Long investment lead times
- Vehicle retirement cycles



# Some dots don't (necessarily) connect

- There is less energy in a gallon of ethanol
- Biodiesel and ethanol are not widely available
- Ethanol has a negative energy balance
- Ethanol subsidies go to big corporations
- We're burning food
- Biodiesel can't replace petroleum diesel
- CAFÉ credits for FFVs result in more use of gas
- Biofuels cost more than petroleum
- Improving gasoline fuel economy is more important



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